Crossrail

Crossrail line 1: Stakeholder Consultation

May 2002

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Foreword

Efficient, direct rail links are essential to safeguard and promote the long-term economic prosperity of London and the South East. Cross London Rail Links Limited (Crossrail) is a new company established to develop and promote these links to meet the needs of people and businesses. It is a 50/50 joint venture between Transport for London (TfL) and the Strategic Rail Authority (SRA). The company aims to ensure that London continues in its role as Europe's leading financial and business centre, and to provide benefits to the wider South East region. It is tasked to develop two new railway lines across Central London. Crossrail line 1 would run on an east-west axis and is to be planned and taken forward to implementation, Crossrail line 2 would run northeast-southwest across the city and is to be planned in principle. Consultation on Crossrail line 2 will be undertaken around the end of this year.

TfL and the SRA aim to provide a fully integrated and comprehensive rail network for London and its surrounding areas. Included are major projects to expand the capacity of the current system. The Mayor's Transport Strategy has highlighted Crossrail lines 1 and 2, Thameslink 2000 and the East London line extensions as priority projects to help achieve this aim. Preparatory works have begun on the northern extension of the East London line, with consent now also granted for the southern extension. The Thameslink 2000 upgrade is currently waiting for final approval. These schemes will mean that London will be well served from north to south. Crossrail line 1 is now being developed to supplement the heavily overcrowded east-west services. Together with Crossrail line 2 it would increase the capacity of the existing network making an important contribution to congestion relief.

Both lines would also provide new links and additional capacity to support economic development and boost regeneration areas. In particular Crossrail line 1 would underpin the growth of London's key financial and business service sector.

Crossrail aims to introduce schemes that are feasible, practical and likely to achieve private sector partner funding. The company has been allocated a budget of £154m by Central Government (through the SRA and TfL) to carry out feasibility work on both lines and secure the statutory approvals needed to build line 1. This represents significant investment by Central Government in the development of new rail infrastructure for London. If the projects are to proceed however, they will need to clearly demonstrate value for money, secure private and public funding and obtain the necessary statutory planning approvals.

Our first priority is line 1 (Crossrail 1). The overall objective of this project is to improve rail transport for London. We are in the process of determining the optimum route, stations and service patterns. There are choices to be made on the routes to be followed in both east and west London and on how far services should run along each corridor.

We recognise that it is important to involve local authorities and other key stakeholders at the earliest opportunity. We also welcome their support in building the transport and wider economic case for the project.
We have therefore prepared this document to explain the shortlisted route corridors for Crossrail line 1, and to seek stakeholders' input to selection of the preferred scheme in Autumn 2002 for wider public consultation.
We welcome your comments.

Consultation

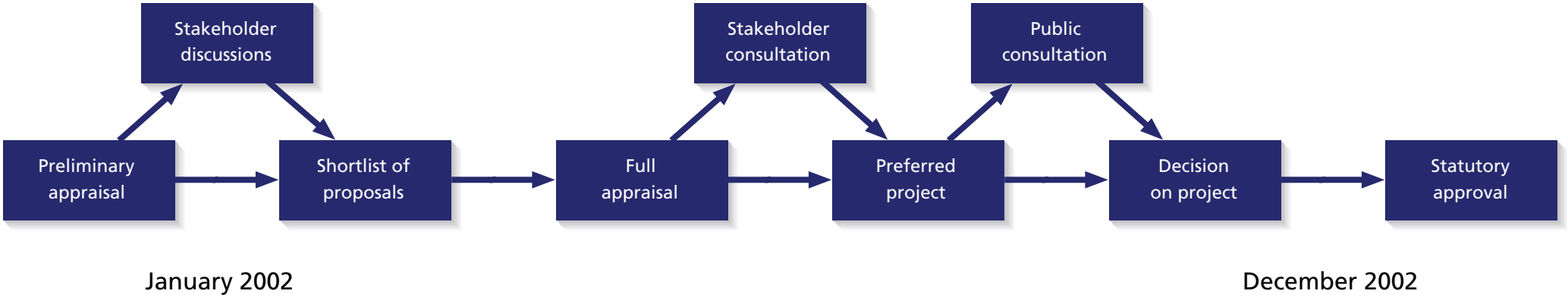
Consultation will play an important role in the decision process. Crossrail 1 will have implications for a wide range of businesses, residents and local communities in London and the South-East. We have now identified a short-list of route corridors and are keen to seek the views of key stakeholders and local authorities. These views will be carefully considered in the route and service selection process. They may also provide support in making the case for Crossrail 1.

The purpose of this document is to:

- set out the agreed economic and planning objectives for the project;
- provide information on the process and timescale for decisions;
- inform key stakeholders and local authorities on the corridors short-listed for Crossrail 1;
- seek views on which route should be adopted and what kind of services should run; and
- set out the criteria by which the final scheme will be judged.

It is intended that the preferred route for Crossrail 1 will be selected in Autumn 2002 after which there will be wider public consultation. This will be followed in 2003 by consultation with those directly affected by the construction and operation of the railway (Figure 1). The views expressed during the consultation process will then be carefully considered in the preparation of an application for statutory consent (possibly using a Hybrid Parliamentary Bill).

Figure 1 **Consultation Process**



The Crossrail Project

The main objectives of Cross London Rail Links are to support the continuing development of London as a World City, and its role as the key financial centre of the UK and Europe, to support its economic growth and its regeneration areas by tackling the lack of capacity and congestion on the existing network, and to improve rail access into and within London.

Transport needs

Large parts of London's public transport system, in particular a number of key Underground and National Rail lines, are running at capacity. Passenger use of the Underground is at record levels and passenger growth on the National Rail Network has also increased significantly with steadily rising numbers of commuters into London. As a result many rail and Underground services are seriously overcrowded.

The provision of rail services is also uneven. Some areas of London, particularly in the east, have relatively poor access by rail. There are a number of major regeneration initiatives to stimulate the provision of new homes and jobs in these areas.

London and the surrounding area are also growing. Greater London Authority forecasts suggest that the population of London will grow from its current level of 7.4 million to over 8.1 million by 2016. It is anticipated that 600,000 new jobs will be created over a similar period. The Thames Gateway, both within and outside the Greater London boundary is expected to see a major increase in both population and employment opportunities.

The Mayor's Transport Strategy aims to develop the transport system to support the future development of London. Central to the Strategy are the major projects that will develop new infrastructure to significantly expand the system.

The Strategy anticipates that the capacity of London's rail network will need to increase by around 50% over the next 15 years to meet these needs. At the same time the Government's Ten Year Plan has a target to increase passenger usage of the National Rail Network by 50%. The major rail projects are expected to make a significant contribution to both capacity and usage increases.

How can Crossrail 1 help?

Extension of suburban services in tunnel, into and across the central area, will increase capacity and bring people directly into the centre without the need for interchanges at National Rail termini. This is a similar principle to the Paris Réseau Express Régional (RER), constructed over the past 25 years to link suburban residential areas to and across the city centre.

Crossrail 1 would provide a new high capacity east-west rail link across London serving Heathrow, the West End, the City and Docklands. This would create new journey opportunities, increase capacity and reduce crowding on several Underground lines. It would also reduce the need for interchanges with National Rail services at Paddington and Liverpool Street stations.

Crossrail as part of an Integrated Rail Network

Crossrail 1 would form part of a more efficient and integrated network of rail services for London. It is one of a package of proposed railway schemes that would work towards achieving this network of services. These schemes include investment in the London Underground and National Rail Networks and the major projects: Thameslink 2000, the northern and southern extensions of the East London line, and Crossrail line 2 as shown in figure 2.

Freight

Crossrail 1 cannot be considered in isolation from the Government's target to increase rail freight.

In the west Crossrail 1 could adversely affect freight (and possibly longer distance passenger) capacity on the Great Western corridor which may only be avoided by providing additional tracks. In the east there would be interactions with freight services in the Stratford area and on the North Kent line. As it will be highly desirable to separate Crossrail from freight and longer distance services these issues will require attention during the development of the project.

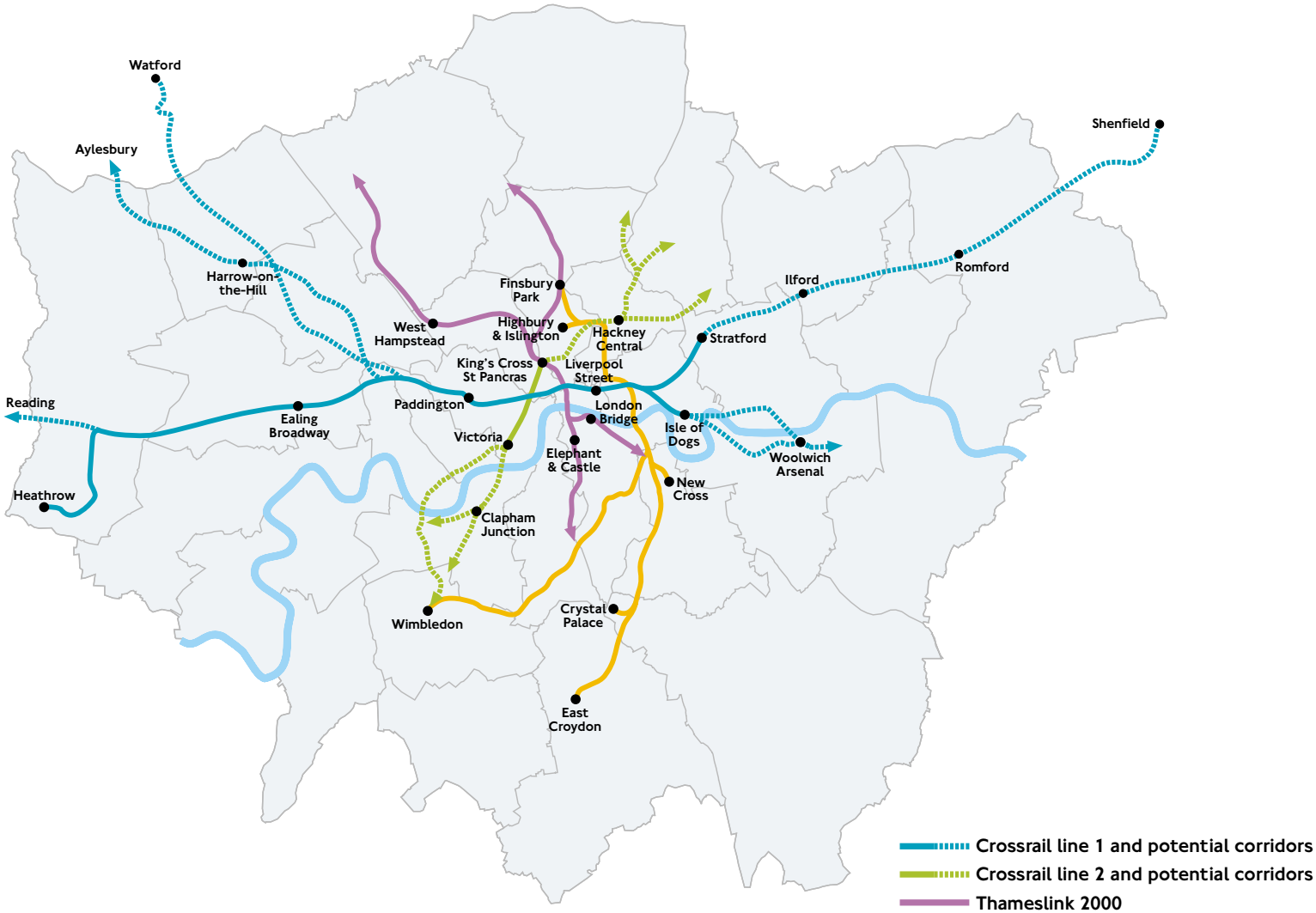
The objectives for Crossrail have been agreed between the Minister,the Mayor and the Chairman of the Strategic Rail Authority.

Specifically Crossrail needs to:

- support the wider transport, planning, social and environmental objectives of the Government's 10 Year Plan, the Mayor's Strategies for London, the Strategic Rail Authority's Strategic Plan and Regional Planning Guidance;
- relieve congestion and overcrowding on the existing National Rail and Underground networks and support the development of a network of strategic interchanges;
- facilitate the continued development of London's primary finance and business service activities, which are now located in both the City and Docklands;
- facilitate the improvement of London's international links, including Heathrow;
- facilitate the regeneration of priority areas, such as the Thames Gateway and the Lea Valley; and
- provide improved east-west rail access into and across London from the East and South East regions.

To meet these objectives Crossrail needs to be feasible from both operational and engineering points of view, environmentally acceptable and value for money.

Figure 2 **Proposed major rail schemes for London**



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The Case for Crossrail

Our initial work demonstrates a good case for building Crossrail 1. We will be developing the case for the project based on these objectives and the following 12 benefits for London and the South-East.

1 **Support for the Development of London's Core Central Functions** Capacity and accessibility would be improved to London's primary finance and business service sectors located in the city and Docklands. It would also provide wider benefits across the central area including key retail and service locations such as Oxford Street and Tottenham Court Road.

2 **Improvement of International Connections** New and improved connections would be provided to London airports and European rail services. These include a new service to Heathrow from Central London, the City and Docklands, an interchange at Farringdon with services to Gatwick and Luton Airports, a potential interchange at Stratford for Stansted, and an interchange with the Channel Tunnel Rail Link at Stratford (and possibly Ebbsfleet).

3 **Support for the Development of London's Town Centres** It would support national planning policy, which seeks to strengthen the role of town centres, both within and outside London, by improving access between centres and into Central London.

4 **Support for the Development of East London and the Thames Gateway** It would play a vital role in the stimulation of development and urban regeneration in East London and the Thames Gateway. This would be achieved through improved transport connections linking these areas with Central London, and interchanges with other services providing connections north and south.

5 **Support for other Regeneration Areas and Sites** It would support the regeneration of key areas highlighted by the 'Initial Proposals for the Mayor's Spatial Development Strategy (2001)' including Key Opportunity Areas such as Park Royal and the Lea Valley.

6 **Encouragement of Social Inclusion** New links from deprived urban areas to jobs and services in Central London and Docklands would improve social inclusion. An example being the proposed interchange at Whitechapel with the extended East London line.

7 **Support for areas outside London** Rail use would be encouraged by providing more capacity and decreased congestion on journeys to and from Greater London. High quality interchanges would help maximise such benefits.

8 **Improved Integration of London's Transport Networks** Crossrail would form part of an integrated transport network including increased multi-modal transport interchanges, feeder services, park-and-ride facilities and new rail services. Crossrail would complement the other major projects proposed by TfL and the SRA.

9 **Improvement of National Rail Connections** Crossrail would provide an alternative to the use of Paddington and Liverpool Street for those travelling east-west. In addition, key connections such as those proposed at Farringdon and Whitechapel would provide a wide range of alternative routes.

10 **Generation of Employment** Crossrail would help reduce costs and so support economic growth. It could help stimulate employment in London's regeneration priority areas and would also generate substantial employment opportunities during the construction phase.

11 **Support for the Environment** Crossrail would promote a modal shift from car to rail. This would help reduce emissions and energy consumption.

12 **Improvement of Accessibility** All new stations would incorporate full access for the mobility impaired. Access within existing stations would also be improved, where practicable, during remodelling.

The Current Position

The Core Route

In order to meet the project objectives all selected corridors provide new services to link Heathrow, Stratford and the Isle of Dogs. This is termed the core route and is shown in Figure 3. This report addresses route options outside the centre of London. Work is currently taking place to refine the alignment between Westbourne Park to the west and Liverpool Street to the east.

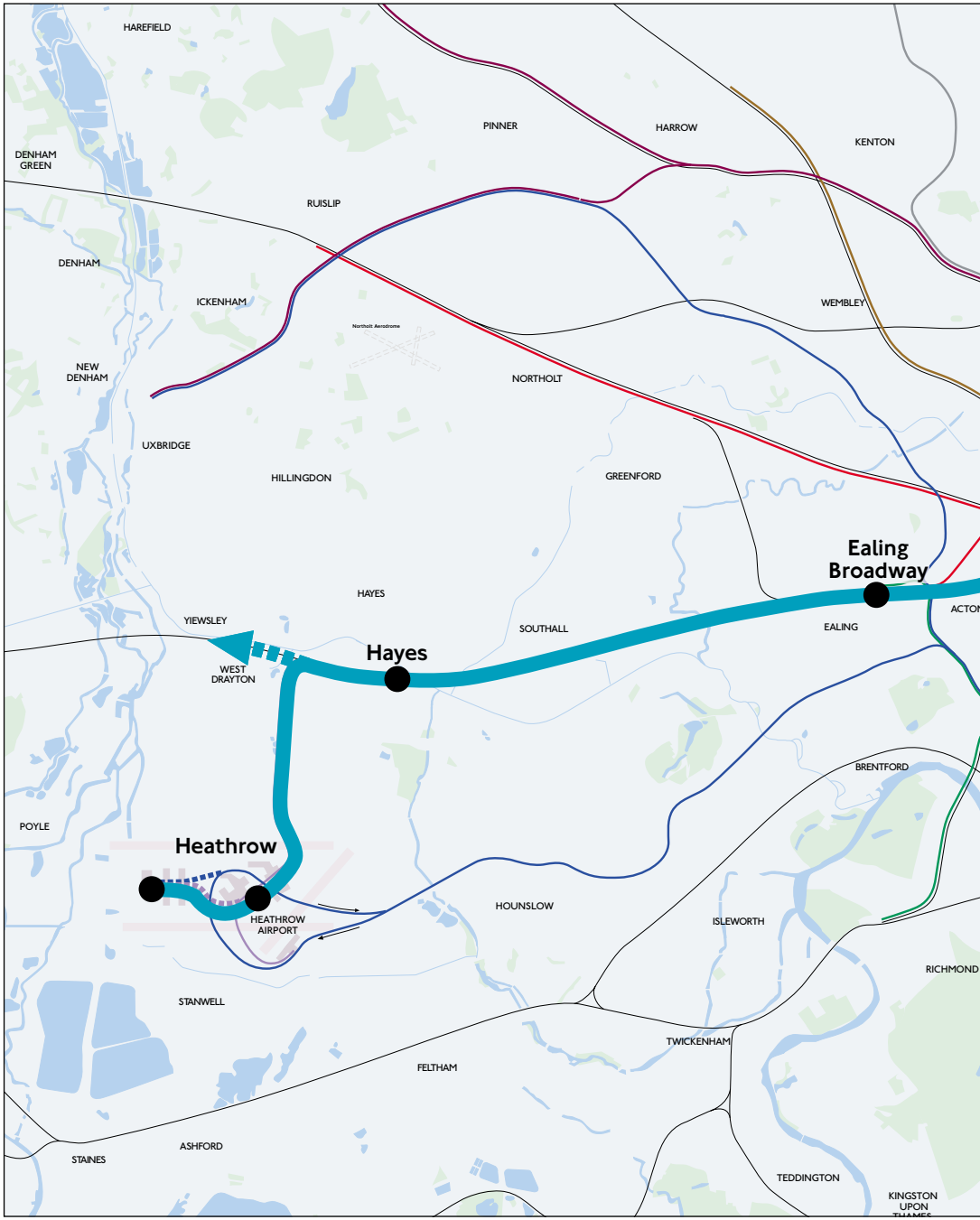
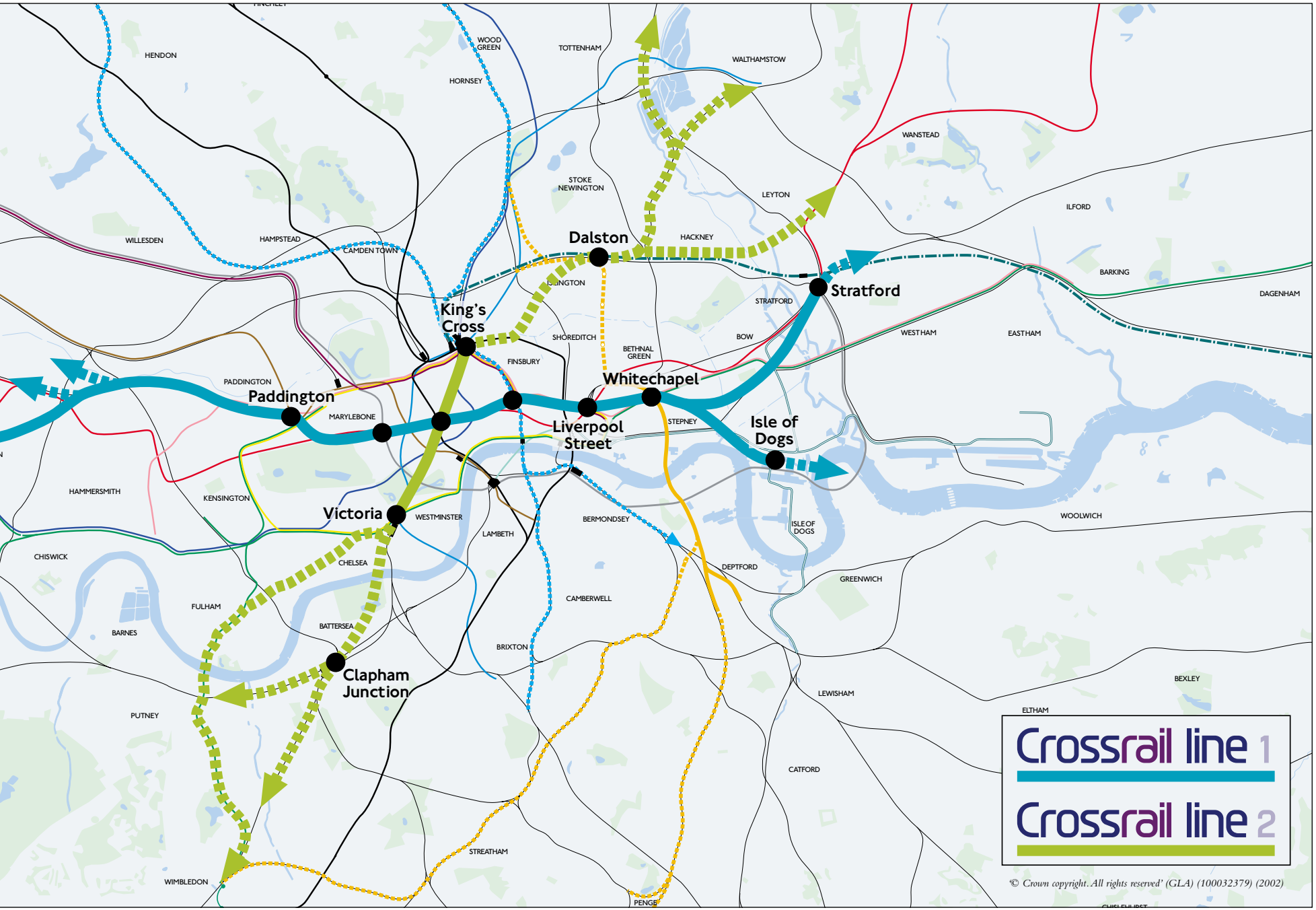


Figure 3 **Core Route**



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Broad Corridors Considered in the Preliminary Sifting Process

In Autumn 2001 the Crossrail Board agreed on broad corridors in east and west London as the starting point for the option selection process (building on the core route). These broad corridors reflect the Crossrail project objectives.

In order to assess their feasibility and impact a total of 19 indicative service options were derived for these corridors, 8 in the west and 11 in the east. The corridors are shown in Figure 4.

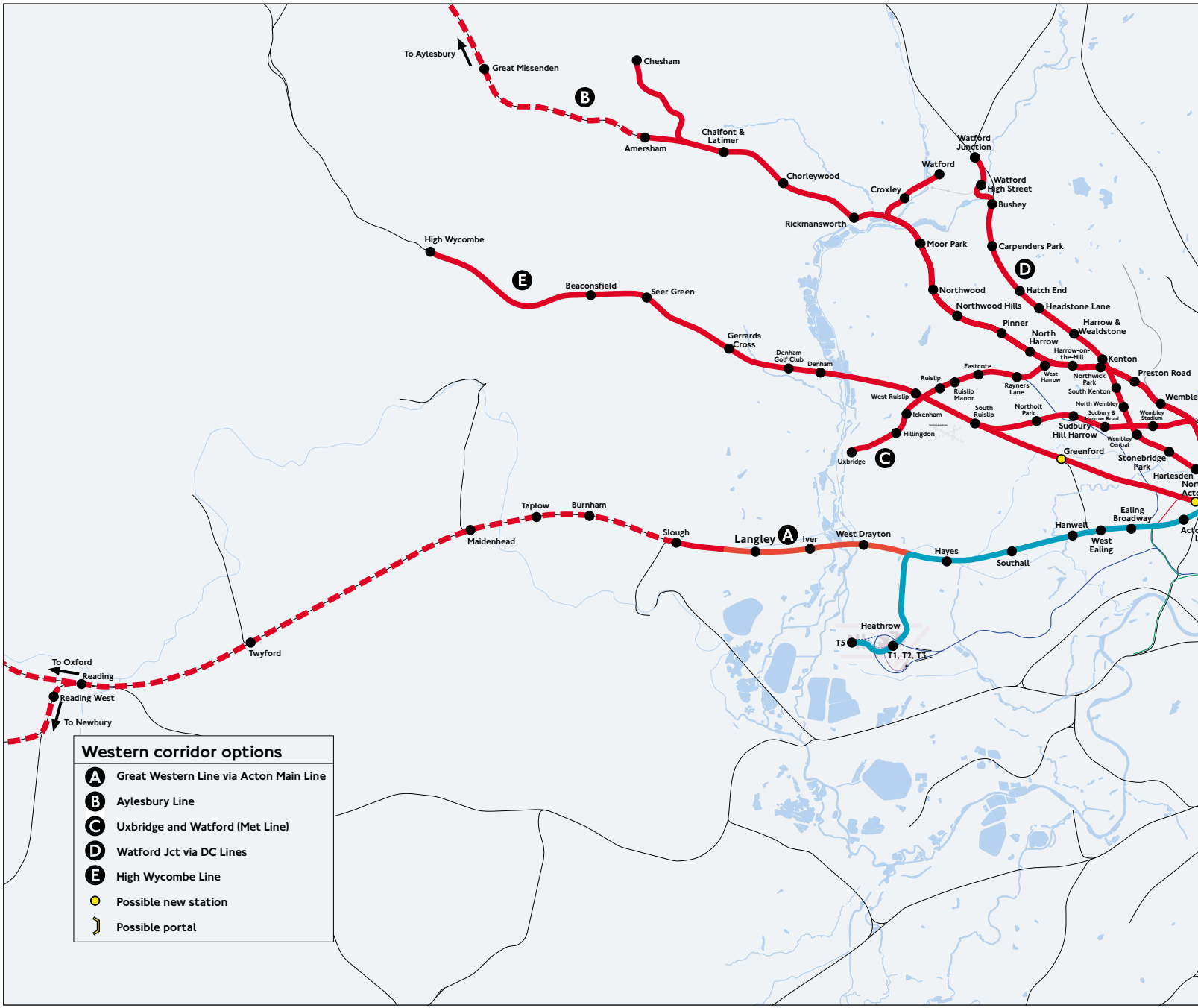
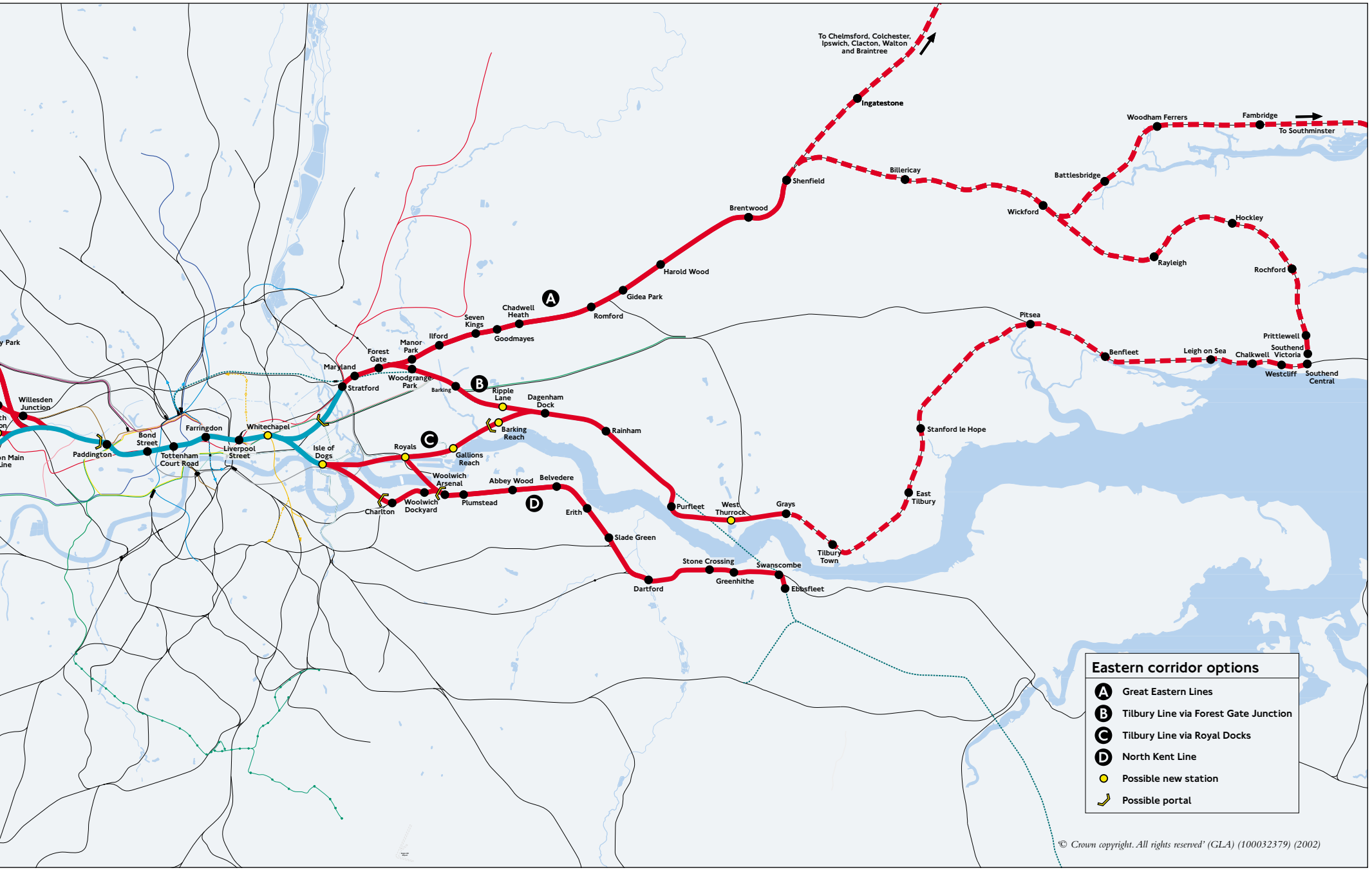


Figure 4 **Potential Route Options**



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The Sifting Process

Over the period between October 2001 and February 2002 these corridors were subject to discussion with a wide range of key stakeholders and to a comprehensive assessment and sifting process. This focussed on six criteria:

- cost (operating and capital);
- benefits (impact on economic development and growth, capacity, congestion relief, time savings, international connections, regeneration, social exclusion, town centre regeneration, regional access, and strategic interchanges)
- environmental effects;
- required statutory consents (railway industry and construction);
- engineering feasibility; and
- operational feasibility.

The corridors were considered against each criterion using a combination of desk top studies, modelling and site visits. The priority was to provide a consistent and objective basis for selection of a short list of options. It was important that the selected options met the Crossrail project objectives. It was also important that they were operationally feasible, could be successfully constructed, were environmentally optimal and would potentially achieve value for money. This information was then fed into an evaluation and sifting process.

Emphasis was placed on the benefits derived from each option and the extent to which these contributed to meeting the Crossrail objectives. TfL's Railplan model was run for all the options to give initial estimates of passenger demand, time savings and the effects on congestion. TfL's CAPITAL model was also used to examine the effects of the options on accessibility to key areas and locations. Capital cost estimates were established based on available information with allowances for risk and compensation. Operating costs were assessed on the basis of incremental costs to the railway system as a whole.

Options in the west were compared against each other, whilst keeping a single option constant in the east. Options in the east were then compared keeping a single option constant in the west.

Corridor Selection

The route and service options were evaluated against each other using the six criteria above. The evaluation was quantified where possible and professional judgement was used where appropriate. Although this process assessed a range of service patterns on different routes, the prime objective of this stage was to select the corridors to take forward. The next stage will include selection of the most appropriate service patterns to run on the shortlisted corridors

Following this preliminary evaluation the Crossrail Board agreed that, taking into account rolling stock and other issues associated with refranchising, the maximum extent of services on Crossrail should be Aylesbury, Watford Junction, Reading, Shenfield and Ebbsfleet, complemented by high quality interchanges with longer distance services. This means that longer distance services, for instance beyond Reading to Oxford, will not be pursued. In the central area, Crossrail will be used much like the Underground, as part of the central area distribution network. This will influence the type of rolling stock, with the need for greater door capacity and interior standing space. These trains are not suitable for longer distance operations.

The Board also agreed that four corridors would not be taken forward to the next stage of project development. These were the corridors to High Wycombe and Uxbridge / Watford in the west; and to Grays via Forest Gate Junction and Grays via the Royal Docks in the east. These were rejected for the following reasons:

- **High Wycombe Corridor:** the population that would be served by this route is low when compared to other corridors. It follows that levels of improved access and congestion relief would be comparatively small. There would also be operability constraints, with a potential conflict between future Crossrail services and existing Chiltern line services to High Wycombe and beyond.

- **Uxbridge and Watford Corridor:** Crossrail would directly replicate the existing Metropolitan line services which already provide a relatively high frequency cross-London service. The benefits to passengers are therefore lower when compared to other options where there is no existing direct ‘through’ service.

- **Grays Corridor via Stratford:** It is important to serve the Shenfield line to secure the congestion relief benefits on the Underground and to increase capacity into Liverpool Street station (allowing improvement of services in the Lea Valley). The need to maintain service capacity on the Shenfield Line means that it would only be possible to serve one other route in the east (without the construction of major infrastructure works with significant land and property implications). This meant that a choice had to be made between a route to Grays via Stratford and one via the Isle of Dogs. Following analysis of economic development, regeneration and transport needs, it was concluded that to serve the Isle of Dogs would provide greater benefits. The Grays corridor via Stratford was therefore not recommended for further assessment.

- **Grays Corridor via Royal Docks:** The text above explains the reasons why a route via the Isle of Dogs was chosen. It then follows that a decision needed to be made between continuing to Grays or connecting to the North Kent line. A corridor to Grays would run mainly in tunnel through the area between the Royal Docks and Barking Creek where there is limited scope for further urban regeneration initiatives and development opportunities. This corridor would not provide a service to Barking town centre, and in addition the extensive tunnelling required would make construction very expensive. It was therefore concluded that the North Kent line corridor should be pursued instead.

The Short List

The Crossrail Board concluded that five corridors should be taken forward to the next stage of appraisal, three in the west and two in the east. Each corridor has a range of potential service options.

To the west:

- the Watford Junction line corridor;
- the Aylesbury line corridor; and
- the Great Western line corridor.

To the east:

- the Great Eastern line corridor; and
- the North Kent line corridor through the Isle of Dogs (via *either* the Royal Docks or Charlton).

These are shown in Figure 5 and described in more detail on the following pages.

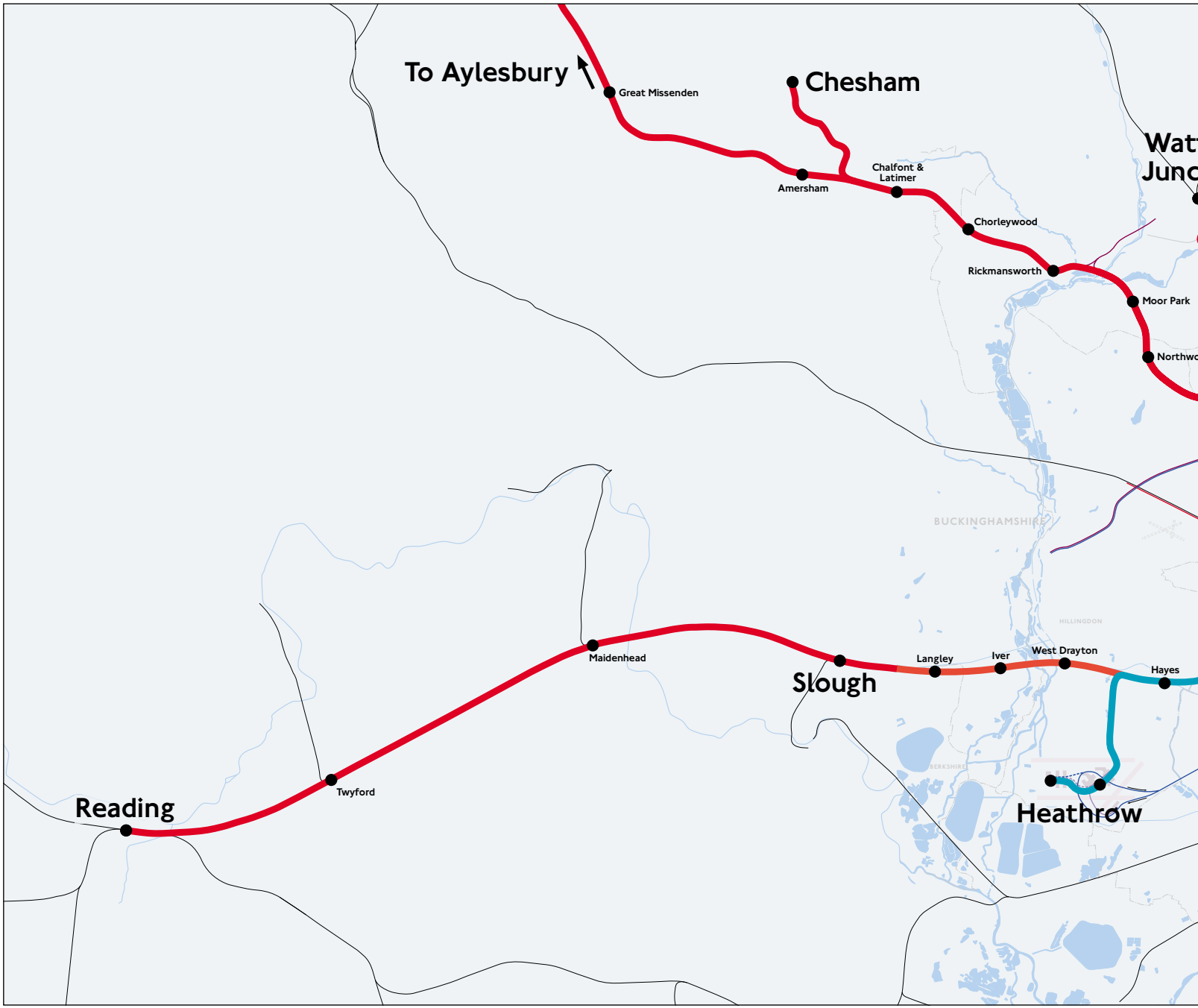
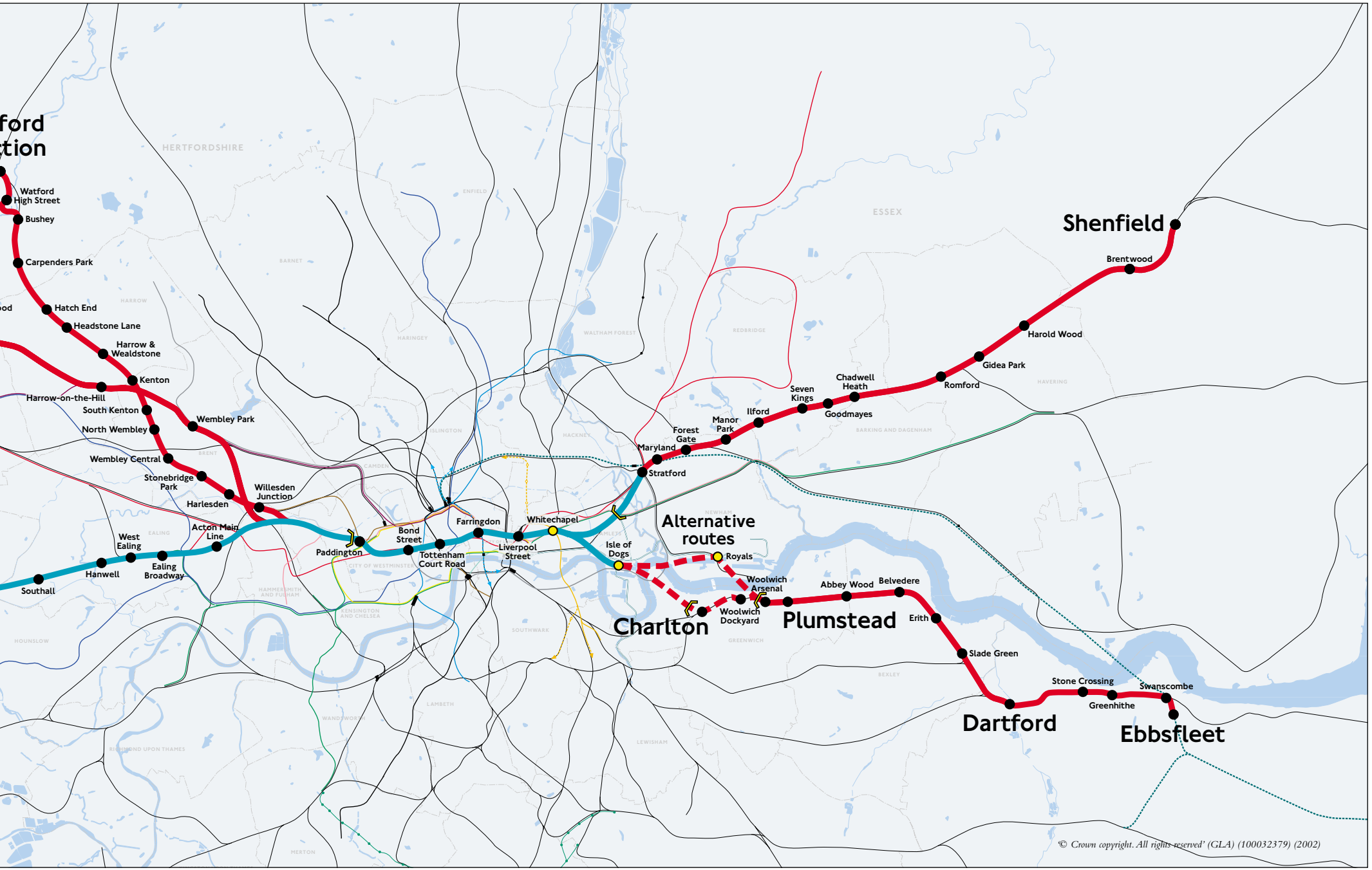


Figure 5 **Short listed corridors**


ford
tion
Watford High Street
Bushey
Carpenders Park
Hatch End
Headstone Lane
Harrow & Wealdstone
Kenton
Harrow-on-the-Hill
South Kenton
North Wembley
Wembley Park
Wembley Central
Stonebridge Park
Harlesden
Willesden Junction
Acton Main Line
West Ealing
Ealing Broadway
Hanwell
Southall
Paddington
Bond Street
Tottenham Court Road
Farringdon
Liverpool Street
Whitechapel
Isle of Dogs
Stratford
Maryland
Forest Gate
Manor Park
Ilford
Seven Kings
Goodmayes
Chadwell Heath
Romford
Gidea Park
Harold Wood
Brentwood
Shenfield
Alternative routes
Royals
Woolwich Arsenal
Woolwich Dockyard
Charlton
Abbey Wood
Belvedere
Plumstead
Erith
Slade Green
Stone Crossing
Greenhithe
Swanscombe
Dartford
Ebbsfleet
HERTFORDSHIRE
ESSEX
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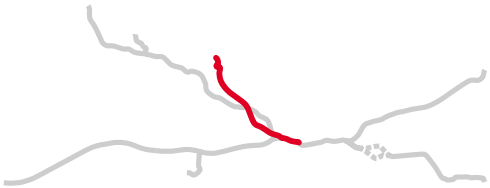
The Short Listed Corridors

Corridor 1: Watford Junction line

Key Areas Served
The corridor would start at the proposed Grand Union Junction (to the west of Paddington station near Ladbroke Grove) and terminate at Watford Junction station. It would serve all existing stations between Willesden and Watford Junctions. This would include stops at Wembley Central, Stonebridge Park and Harlesden.

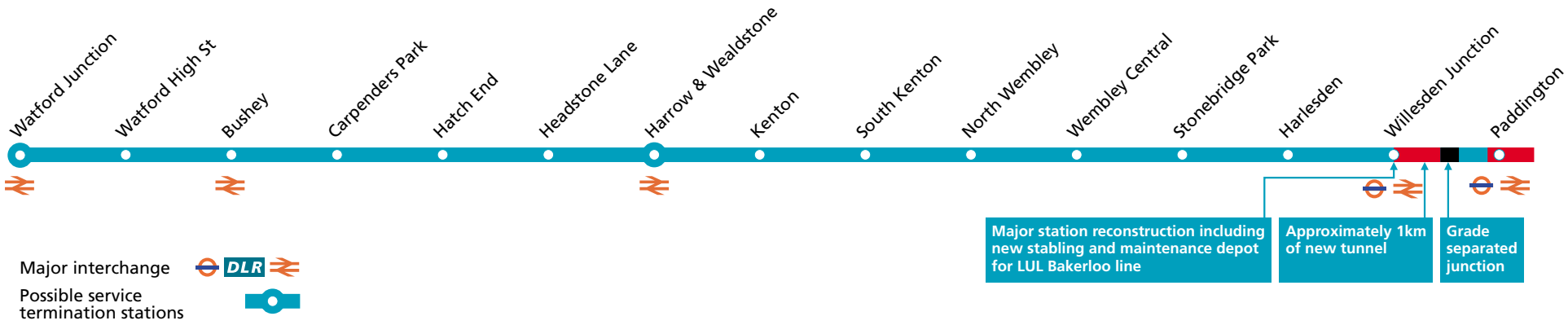


Key Interchanges
Interchanges with longer distance suburban services would be possible at Watford Junction (where there are also inter-city connections), Harrow & Wealdstone and Willesden Junction (subject to the construction of new platforms). This would deliver significant congestion relief to London Euston. There would also be connections at Willesden Junction with services on the North London line towards Highbury & Islington and Richmond, and on the West London line to Clapham Junction. In addition, the Bakerloo line would provide direct links to the West End from Willesden Junction. There would also be convenient interchanges with buses at many stations.

Impact on Other Services
The introduction of Crossrail 1 services on this corridor would require the withdrawal of Bakerloo line services between Willesden Junction and Harrow & Wealdstone and Silverlink Metro services to Watford Junction.

Engineering
This corridor would require approximately 1km of new tunnel between Grand Union Junction and Willesden Junction.
There would also be a number of other engineering works required including:
a grade-separated junction at Kensal Green, major works to selected stations (including new platforms), and extensive signalling and overhead electrification works. In addition, a new depot would be required in the Willesden Junction area, with more train stabling sidings at Queen's Park for the Bakerloo line. The existing depot at Stonebridge Park would also need to be reconfigured.

Benefits
This corridor would provide significant time savings to the West End, City and Docklands from areas along the route to Watford, and for passengers interchanging from other services. It would directly serve the deprived areas of Willesden, Neasden and Carpenders Park, and would serve the Park Royal regeneration area. It would also provide congestion relief to the Jubilee and Metropolitan lines at Baker Street by providing additional services on the Harrow and Wembley corridor.



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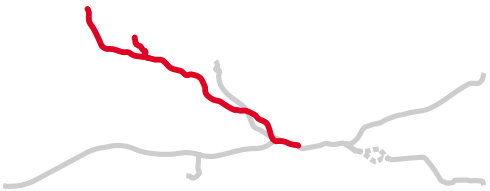
Corridor 2: Aylesbury line

Key Areas Served
The corridor would serve the county town and regional centre of Aylesbury, with a branch to Chesham. It would start at Grand Union Junction (to the west of Paddington station near Ladbroke Grove) and terminate at Aylesbury. It would serve all stations currently served by Chiltern and Metropolitan 'fast' trains, and Wembley Park and Northwood stations. Crossrail 1 services would join the Chiltern line north of Neasden Junction. The route would serve the Wembley Key Opportunity Area, Harrow Metropolitan Town Centre, and numerous residential areas.

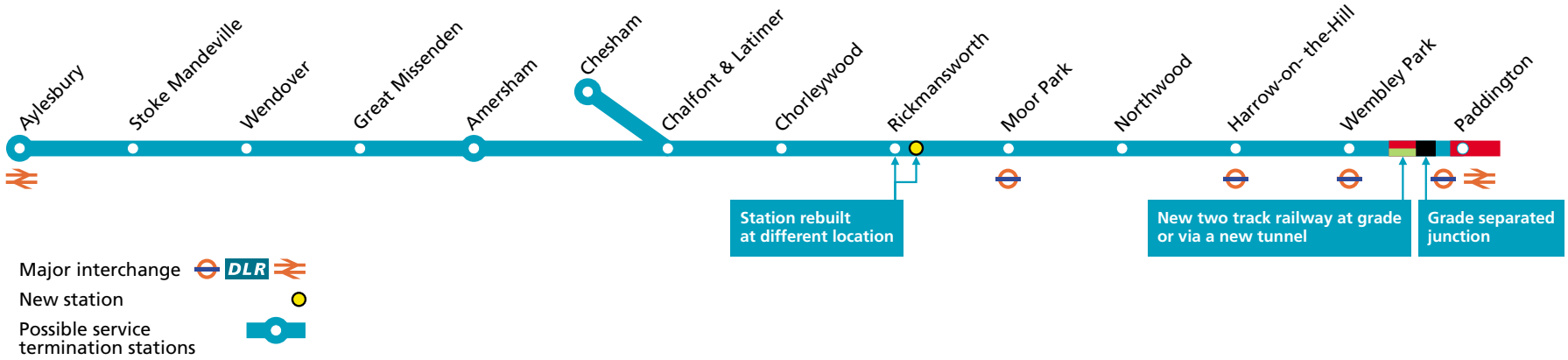


Key Interchanges
There would be interchanges with the Jubilee and Metropolitan lines at Wembley Park, the Uxbridge branch of the Metropolitan line at Harrow-on-the-Hill, the Watford branch of the Metropolitan line at Moor Park and the Princes Risborough service at Aylesbury. There would also be convenient interchanges with buses at many stations (particularly Harrow-on-the-Hill).

Impact on Other Services
The introduction of Crossrail 1 services on this corridor would result in fewer Chiltern line and Metropolitan line trains operating into Marylebone and Baker Street/Aldgate, respectively. It is possible that the paths released by substitution of the Chiltern line service would enable a more frequent service on the High Wycombe route, while those released on the Metropolitan line may permit an increased frequency of Underground services between Watford and Uxbridge to Central London.

Engineering
A new two-track railway would be constructed either through Old Oak Common depot linking up with the freight-only Dudding Hill Line or via a new tunnel to Neasden. There would be a number of other engineering works including a grade-separated junction at Kensal Green, major station works at Harrow-on-the-Hill, Moor Park and Rickmansworth, and new platforms at Wembley Park and Northwood Stations. The corridor would also require overhead electrification from Grand Union Junction to Aylesbury (including the Chesham Branch).

Benefits
This corridor would provide significant time savings to the West End, City and Docklands from areas along the route to Aylesbury, and for passengers interchanging from other services. It would serve deprived areas in Aylesbury, Willesden and Neasden, provide congestion relief for the Jubilee and Metropolitan lines through provision of services on the Harrow-on-the-Hill and Wembley Park corridor and relief for the Circle line through provision of alternative services direct to the City.



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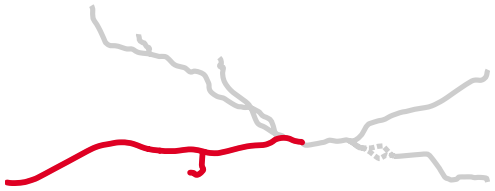
Corridor 3: Great Western line

Key Areas Served
Services on the Great Western line corridor could terminate at Heathrow, Ealing Broadway, Slough or Reading. The Heathrow service could serve terminals 1,2,3 and 5 at Heathrow Airport, providing a stopping service to complement Heathrow Express to Paddington. One variant on this corridor would involve a limited service to Heathrow with all other Crossrail trains on this corridor terminating at Ealing Broadway, where a new high-quality interchange could be provided. An alternative, with services to Slough and/or Reading would provide improved service and frequencies to central London for stations between Slough and Paddington. Both variants would provide longer and more frequent trains relieving overcrowding and enabling more regular stopping patterns.

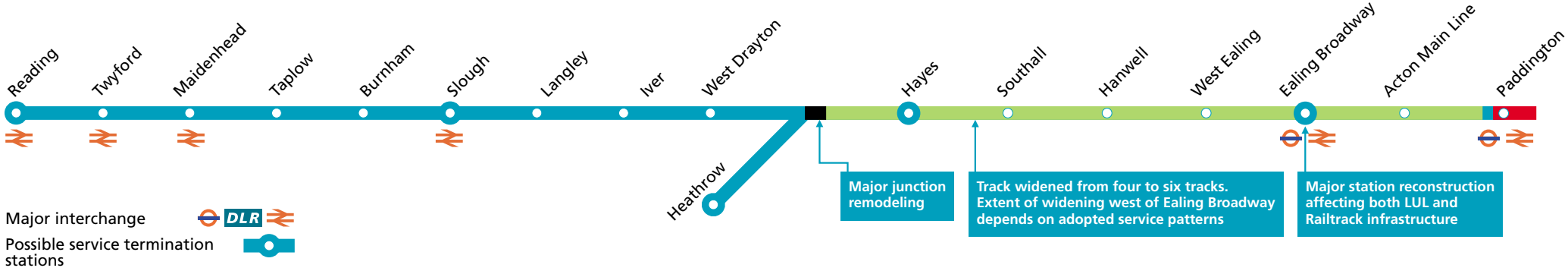


Key Interchanges
There would be interchanges with the Central and District lines at Ealing Broadway; with Thames Trains at Slough; Maidenhead and Twyford; and with inter-city and local services at Reading. There would also be good interchanges with buses at many stations, especially Ealing Broadway, Slough and Reading; and with the proposed West London Transit Intermediate Mode scheme at Ealing Broadway.

Impact on Other Services
Widening of the track layout between Grand Union Junction and Airport Junction would create additional capacity on the Great Western line for the benefit of a number of passenger and freight operators.

Engineering
The limited service to Heathrow with all other trains terminating at Ealing Broadway would require the remodelling of Airport Junction (the junction of the Great Western line with the branch to Heathrow Airport), and widening of the track layout from four to six tracks as far as Ealing Broadway. Services to Heathrow and Slough would require more extensive widening of the railway to six tracks beyond Ealing to Airport Junction and the electrification of the line from Airport Junction to Slough and/or Reading. All options will require major works at most stations, including reconstruction of Ealing Broadway.

Benefits
This corridor would provide significant time savings to the West End, City and Docklands from areas along the route to Reading, and from surrounding towns (through interchanges with Crossrail services). It would also serve deprived areas along the corridor and improve accessibility to Heathrow for areas across the entire South East region. Crossrail services on the Great Western line would increase service frequencies on this corridor and attract passengers from the adjacent Central and Piccadilly lines. This would provide congestion relief on these Underground services.



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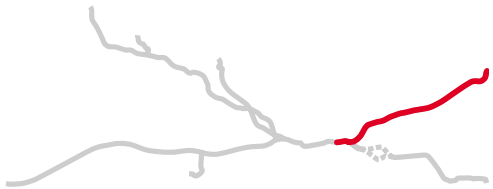
Corridor 4: Great Eastern line



Key Areas Served
The corridor would extend east from a tunnel portal at Bow, terminating at Shenfield. It would provide services to Gidea Park and Shenfield using the Great Eastern line (via Ilford and Romford Metropolitan Town Centres).

Key Interchanges
It would serve the Stratford Key Opportunity Area providing an interchange with the Channel Tunnel Rail Link. It would also provide an interchange with the District line, Hammersmith & City line and the East London line at Whitechapel. The East London line connection would provide a link south to New Cross and, once the East London line extensions are complete, links north to Highbury and south to Wimbledon and West Croydon.
The corridor would provide interchanges with Docklands Light Rail, Jubilee line and Central line at Stratford; and good bus interchanges at many stations, especially at Stratford, Ilford and Romford. Links to the proposed East London Transit Intermediate Mode scheme at Ilford and Romford would also be possible.

Impact on Other Services
The additional capacity created by Crossrail 1 between Stratford and Liverpool Street would enable additional National Rail services to operate between the Lea Valley and Liverpool Street.

Engineering
This corridor would require extensive construction works for the tunnel portal, major remodelling of Stratford Station and the lengthening of existing platforms at most stations.

Benefits
This corridor would provide time savings to the West End, City and Docklands from areas along the route to Shenfield, and from some town centres beyond. It would improve access to Stratford (particularly from the west). It would also serve deprived areas in east London, provide additional train paths into Liverpool Street and provide significant congestion relief for the Central, District and Circle lines.

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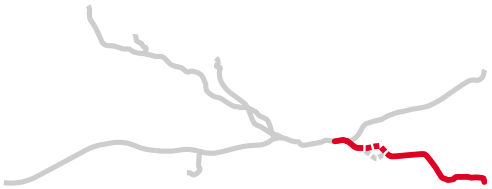
Corridor 5a: North Kent line via the Royal Docks

Key Areas Served

The corridor would run in new tunnel from Stepney Green through the Isle of Dogs to the Royal Docks and on to the North Kent lines. The tunnel portal would be located between Woolwich Arsenal and Plumstead stations. The route would then extend to Plumstead, Dartford and/or Ebbsfleet and could terminate at any of these three locations. It would provide new stations at Isle of Dogs, Royal Docks, and possibly Silvertown (providing access to London City Airport), and a new underground station at Woolwich Arsenal.



Key Interchanges

There would be interchanges with the Jubilee line and Docklands Light Rail at the Isle of Dogs station. The station at Woolwich Arsenal would provide a connection with the proposed Docklands Light Rail station and National Rail services to Lewisham and London Bridge. There would be an interchange at Dartford with National Rail services to Gravesend and the Medway towns, and an extension to Ebbsfleet would create a second interchange with the Channel Tunnel Rail Link. There would also be good interchanges with buses at many stations (especially Woolwich Arsenal and Dartford), and there would be an interchange with the proposed Waterfront Transit Intermediate Mode Scheme at Woolwich Arsenal and Abbey Wood.

Impact on Other Services

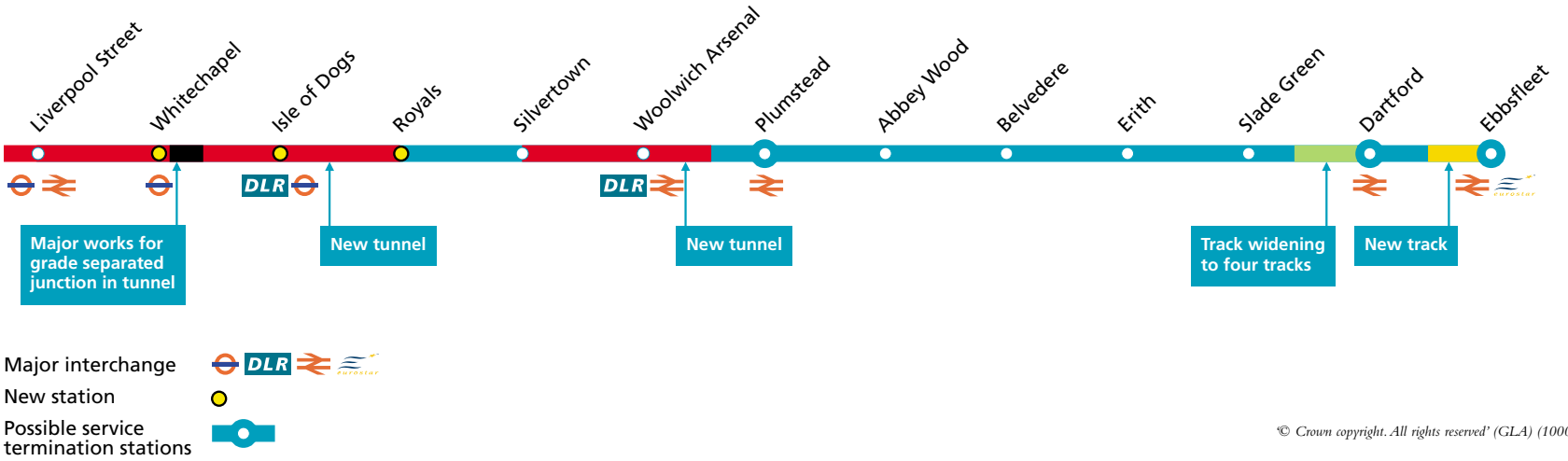
The introduction of Crossrail 1 services on this corridor would require the substitution of existing National Rail services on the North Kent line between Plumstead and Slade Green. Existing National Rail services to and beyond Dartford would be diverted via either the Sidcup or Bexleyheath branches, while new metro-style shuttle services would be introduced between Plumstead and central London via both Greenwich and Blackheath.

Engineering

The corridor would require a new tunnel from Stepney Green to Custom House (Royal Docks). It would use the North London Line to Silvertown and then continue in new tunnel surfacing onto the North Kent lines between Woolwich Arsenal and Plumstead. This corridor would require approximately twice the length of tunnel than the alternative Charlton route (Corridor 5b). The route to Dartford would require an additional set of tracks (four-tracking) between Crayford Creek Junction and Dartford Junction. The extension out to Ebbsfleet would require 4km of new track from Swanscombe to Ebbsfleet to accommodate both Crossrail services and existing services on the North Kent lines.

Benefits

This corridor would provide time savings to the West End and City, and significant time savings to Docklands from all areas along the route including town centres beyond Dartford. It would provide improved accessibility to regeneration areas in the south Thames Gateway area, Woolwich town centre and the Royal Docks.



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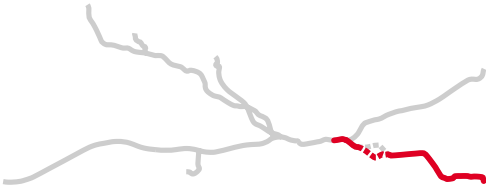
Corridor 5b: North Kent line via Charlton

Key Areas Served
This corridor would run in new tunnel from Stepney Green through the Isle of Dogs to Charlton and on to the North Kent lines. The tunnel portal would be located north of Charlton on the Greenwich Peninsula. A new surface railway would be required from the portal to Charlton, with the provision of a new Charlton station. The route could either terminate at Charlton or extend to Dartford and/or Ebbsfleet. There would also be a new station at the Isle of Dogs.

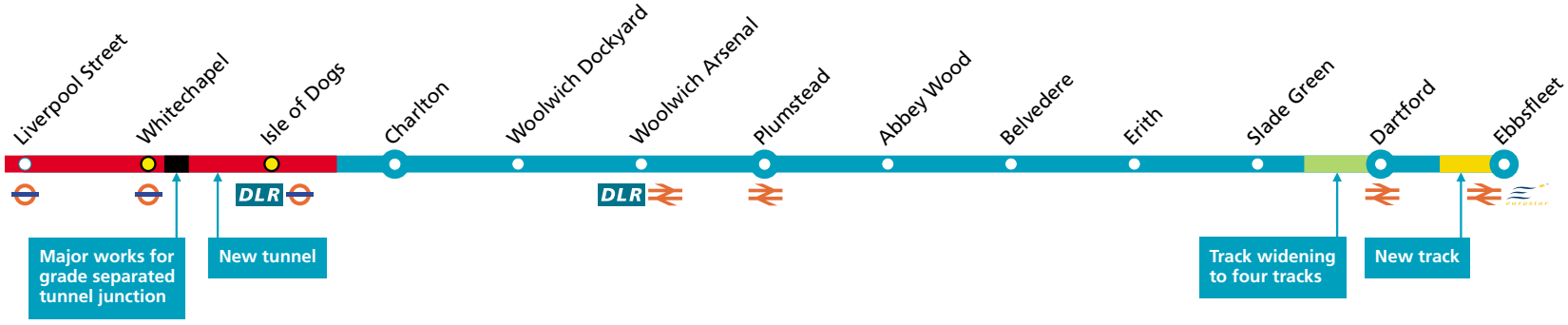


Key Interchanges
There would be interchanges with the Jubilee line and Docklands Light Rail at the Isle of Dogs. The station at Woolwich Arsenal would provide an interchange with the proposed Docklands Light Rail station and with National Rail services to London Bridge and Lewisham. There would also be an interchange at Dartford with National Rail services to Gravesend and the Medway towns. An extension to Ebbsfleet would create an interchange with the Channel Tunnel Rail Link. There would also be good interchanges with buses at many stations, especially Woolwich Arsenal and Dartford, and interchanges with the proposed Waterfront Transit Intermediate Mode Scheme at Charlton, Woolwich Arsenal and Abbey Wood.

Impact on Other Services
The introduction of Crossrail 1 services on this corridor would substitute some existing National Rail services on the North Kent line between Charlton and Slade Green. Existing National Rail services beyond Dartford would be diverted via either the Sidcup or Bexleyheath branches, while new metro-style shuttle services would be introduced between Charlton and Central London via both Greenwich and Blackheath.

Engineering
There would be a new tunnel from Stepney Green to the Greenwich Peninsula (including the construction of a new station at the Isle of Dogs). The tunnel portal would be located north of Charlton with new track running to Charlton station. The route from Plumstead to Dartford would require a new set of tracks (four-tracking) between Crayford Creek Junction and Dartford Junction. The extension out to Ebbsfleet would require 4km of new track from Swanscombe to Ebbsfleet. The new track is required to create enough capacity to accommodate both Crossrail services and existing services on the North Kent lines.

Benefits
This corridor would provide time savings to the West End and City and significant time savings to Docklands from all areas along the route and town centres beyond Dartford. It would provide improved accessibility to regeneration areas in the south Thames Gateway area, and to Woolwich town centre.



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The Way Forward

The short-listing process has identified five potential Crossrail 1 corridors, three in the west and two in the east. The task is now to appraise these corridors and possible service patterns in more detail. On the basis of this appraisal a recommendation for the preferred Crossrail 1 alignment will be made later this year. Implementation of the chosen scheme will then be dependent on securing the necessary statutory powers.

On the five short-listed corridors there are several possible end and intermediate destinations for services giving a range of service pattern combinations.

The potential end destinations for services are:

In the west:
Watford
Aylesbury (and Chesham)
Ealing Broadway
Heathrow
Slough
Reading

In the east:
Shenfield
Plumstead
Dartford
Ebbsfleet

Refining the Short-List

In refining the short-list it will be necessary to consider the remaining alternative routes in the eastern and western corridors and determine optimal service patterns on the various branches. In the west it is most unlikely that services on both the Aylesbury and Watford Junction routes will be possible, so a choice between these two routes will need to be made. In the east there is a choice between the route via Charlton and the route via the Royal Docks on to the North Kent line.

A comparison between choices in the east and choices in the west will be made in a similar manner to the initial short-listing. The options in the west will be compared against each other whilst keeping a single option constant in the east. This principle will also apply to the appraisal of the eastern options.

To determine optimal service patterns, it will be necessary to develop and test a range of service patterns on all branches. Many service pattern permutations are possible. The assessment will examine different stopping patterns and frequencies and test how services in the east will link with those in the west. This is important as it will determine issues such as which locations in the east could benefit from a direct service to Heathrow.

Option Assessment

The main focus of the assessment will be the Crossrail objectives and the extent to which they are met. Key considerations will also be the degree of operational and construction feasibility, environmental effects and value for money. The assessment will therefore combine these issues into one multi-criteria appraisal process. This will be based on the five criteria: environment, safety, economy, accessibility and integration introduced in the "New Deal for Transport (DTLR 1998)".

The topics to be addressed and the key measures to be used in the appraisal are shown in the table. The work will take into account:

- Current HM Treasury and DTLR guidance on appraisals
- DTLR 'Guidance on the Methodology for Multi-modal studies (GOMMS)
- The national perspective - thus the net contribution to the UK economy and employment will be assessed, as well as the contribution to other Ten Year Plan targets
- A range of sensitivity and value for money tests on the key assumptions

The Final Selection Process

A recommendation for the preferred Crossrail 1 route will be made to the Crossrail Board towards the end of 2002. This will be based on an analysis using the multi-criteria framework, results of parallel work considering funding and procurement options, and the views of key stakeholders. In reaching the decision the Board will also assess the affordability of the project. This will be strongly influenced by the potential degree of private sector involvement.

Crossrail Project line 1 Draft Appraisal Framework			
Criteria	**Context**	**Impact**	**Proposed Measurement**
Environment	Crossrail aims to improve the environment, at the same time minimising any adverse impacts of construction and operations	Noise	Effect of noise and vibration from construction of the scheme
			Effect of rail noise in the corridors, of station facilities and of changes to road traffic flows and other construction activities
			Effects of reduction in car use on key highways
		Local air quality	Effect on local air quality as a result of extracting and transporting spoil, and effects of modal shift during operation
		Global emissions	Effect on CO^2 emissions (as a key indicator) and hence the global environment as a result of changes in car and rail use
		Landscape	Effect on the landscape of temporary and permanent works in rural areas
		Townscape	Effect on the townscape of temporary and permanent works in suburban and urban areas
		Heritage	Effect on heritage resources (including archaeology) of temporary and permanent works
		Biodiversity	Effect on species and habitats of temporary and permanent works
		Water Environment	Effect on the water environment of temporary and permanent works
		In-vehicle quality	Improvements in journey quality attributes
		Land / property	Permanent and temporary land and property requirements
Safety	Crossrail aims to improve the safety of travel	Accidents	Changes in accidents by all modes, particularly as a result of transfer from car
		Security	Changes in security on the transport network and the number of people affected
Economy	Crossrail aims to support the London Plan and Regional policies	Employment	Changes in accessibility and transport capacity to major employment areas, particularly the key finance and business sector locations, town centres and central London
			Direct and indirect impact on employment levels particularly in the key finance and business sector located in the City and the Isle of Dogs
			Job creation during construction
			Effect on local economies around stations
			Effect on unemployment
			Effect on the wider UK economy
			AM peak period transport benefits by destination
		Housing supply	AM peak period transport benefits by origin
		Regeneration	Changes in accessibility to key regeneration areas
		Property Values	Change in property supply and values
	Crossrail aims to provide value for money in design and operation and be financeable	Costs	Capital cost of land and property
			Capital costs of construction
			Capital cost of signalling and systems
			Capital/lease costs of rolling stock
			Annual maintenance costs
			Annual operating costs
			Access and compensation charges
	Crossrail aims to provide significant transport benefits	Transport Benefits	Time saving benefits to existing and new users
			Reliability improvements
			Benefits from relief of congestion on existing rail services
			Benefits from relief of congestion at stations
			Highway operating cost savings and congestion relief benefits

Crossrail Project line 1 Draft Appraisal Framework (continued)			
Criteria	**Context**	**Impact**	**Proposed Measurement**
Economy (continued)	Crossrail aims to generate significant surplus over its operating costs	Revenue	Gross and net revenue generated from fares on Crossrail 1
			Other income (advertising etc)
			Impact on other operators
	Crossrail aims to minimise the public sector cash requirement	Finance	Overall cash flow for the project
			Cash flows assuming private sector involvement
			Estimates of developer contributions
			Other indirect cash flows (e.g. exchequer income via increased business rates)
	Crossrail aims to identify, quantify and minimise the key risks for the project	Risks	Identification of key statutory consent, engineering, operational, financial and economic risks and likelihood of occurrence
			Sensitivity tests of the major risks to the financial and economic case
	Crossrail aims to provide good value for money	Value for money	Net Present Financial Cost of the Project
			Net Present Benefits of the project
			Net Present Value and Internal Rate of Return
			Conventional cost : benefit ratio including transport benefits and accident savings but excluding wider benefits
			Cost : benefit ratio taking into account the wider effects on the London and UK economy Sensitivity tests
Accessibility	Crossrail aims to improve access to and from the regions into and across London; and Crossrail aims to improve accessibility within London	Travel times	Changes in travel times between selected origins and destinations
	Crossrail aims to be accessible to all	Access for mobility impaired passengers	Change in the number of stations with provision for the mobility impaired and interconnections with other accessible services
		Social inclusion	Change in accessibility to areas of high deprivation
Integration	Crossrail aims to support planning, social and environmental objectives	Land use policy	Extent to which the project supports the integration of transport and land use planning within the objectives of the Government's 10 year Plan, the Mayor's Spatial Development Strategy and Regional Planning Guidance
	Crossrail aims to improve London's international connections	Air	Impact on accessibility to London's airports
		Rail	Impact on accessibility to the international stations (St Pancras, Waterloo, Stratford and Ebbsfleet)
	Crossrail aims to support the development of strategic interchanges and town centres	Interchange Strategy	Changes in the number and quality of interchanges
			Impact on the connectivity of the transport network
	Crossrail aims to integrate with other projects and proposals	Transport Integration	Extent to which the project complements other transport projects, proposals and policies e.g. Crossrail line 2, Thameslink 2000 and ORBIT proposals

We need your views

There are choices to be made on the routes for the Crossrail Line 1 project, and on issues such as the extent of services and the key interchanges. We would like your views on the options presented in this document.

Key choices that need to be made at this stage include the selection of routes in the west – whether to serve Watford or Aylesbury, and in the east – whether to run via Charlton or the Royal Docks. There are then choices to be made about how far and how many services should run, particularly on the Great Western and North Kent line corridors.

Our aim is to provide the Crossrail line 1 scheme which represents best value for money, is feasible in both engineering and operational terms, and for which funding is possible. To achieve this we will need to justify why the project is necessary and to demonstrate its impact over a wide range of issues and areas.

We would therefore welcome your views on the Crossrail Line 1 project as a whole, how important you think it is for London and the South East and what impact you think it will have on your particular area of interest. You may also wish to comment on our proposed appraisal framework.

We will use your responses in the selection process to help determine the preferred route, and support the general case for the project.

Please provide your response by Friday 26th July 2002 to:

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